

Borehole

50-09-01**Log Event A**

Borehole Information

Farm : <u>T</u>	Tank : <u>T-109</u>	Site Number : <u>299-W10-164</u>
N-Coord : <u>43,493</u>	W-Coord : <u>75,785</u>	TOC Elevation : <u>671.17</u>
Water Level, ft : <u>85</u>	Date Drilled : <u>9/30/1975</u>	

Casing Record

Type : <u>Steel-welded</u>	Thickness, in. : <u>0.280</u>	ID, in. : <u>6</u>
Top Depth, ft. : <u>0</u>	Bottom Depth, ft. : <u>150</u>	

Borehole Notes:

Borehole 50-09-01 was drilled in August and September 1975 to a depth of 150 ft. The driller's log indicates that a 10-in. casing was drilled to a depth of 69 ft. The borehole was downsized to 8-in. casing and drilled to a depth of 95 ft. Radiological contamination was encountered below about 60 ft, and the downsizing may have been an effort to limit the carry-down of contamination during drilling. The driller's log does not note any radiological contamination below a depth of 95 ft. The borehole casing was downsized again at a depth of 95 ft and 6-in. casing was drilled from 95 to 150 ft. A total of 60 ft of the 6-in. casing was withdrawn from the borehole and the borehole was completed to a depth of about 90 ft. The bottom portion of the borehole was grouted with cement. There is no indication that the 8-in. or 10-in. casings were withdrawn or that the casings were perforated.

Observations made during logging operations do not indicate that there is more than one casing in this borehole. On the basis of the information provided in the driller's log, it appears that three casings are present.

The top of the 6-in. casing, which is the zero reference for the SGLS, is approximately even with the ground surface.

Equipment Information

Logging System : <u>2B</u>	Detector Type : <u>HPGe</u>	Detector Efficiency: <u>35.0 %</u>
Calibration Date : <u>10/1997</u>	Calibration Reference : <u>GJO-HAN-14</u>	Logging Procedure : <u>MAC-VZCP 1.7.10-1</u>

Logging Information

Log Run Number : <u>1</u>	Log Run Date : <u>01/07/1998</u>	Logging Engineer: <u>Alan Pearson</u>
Start Depth, ft.: <u>86.0</u>	Counting Time, sec.: <u>100</u>	L/R : <u>L</u> Shield : <u>N</u>
Finish Depth, ft. : <u>27.0</u>	MSA Interval, ft. : <u>0.5</u>	Log Speed, ft/min.: <u>n/a</u>

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Log Run Number :	<u>2</u>	Log Run Date :	<u>01/09/1998</u>	Logging Engineer:	<u>Alan Pearson</u>
Start Depth, ft.:	<u>0.0</u>	Counting Time, sec.:	<u>100</u>	L/R : <u>L</u>	Shield : <u>N</u>
Finish Depth, ft. :	<u>28.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

Log Run Number :	<u>3</u>	Log Run Date :	<u>01/09/1998</u>	Logging Engineer:	<u>Alan Pearson</u>
Start Depth, ft.:	<u>65.0</u>	Counting Time, sec.:	<u>100</u>	L/R : <u>L</u>	Shield : <u>N</u>
Finish Depth, ft. :	<u>50.0</u>	MSA Interval, ft. :	<u>0.5</u>	Log Speed, ft/min.:	<u>n/a</u>

Logging Operation Notes:

The borehole was logged in three runs, one of which was a rerun log. The total logging depth achieved by the SGLS was 86 ft. Spectra were collected at intervals of 0.5 ft using a 100-s counting time.

There was water in the borehole at a depth of 85 ft at the time of logging.

Analysis Information

Analyst : D.L. ParkerData Processing Reference : MAC-VZCP 1.7.9Analysis Date : 05/22/1998**Analysis Notes :**

The pre-survey and post-survey field verification for each logging run met the acceptance criteria established for peak shape and system efficiency. The energy calibration and peak-shape calibration from the field verification spectrum that most closely matched the field data were used to establish the peak resolution and channel-to-energy parameters used in processing the spectra.

A casing correction factor for a 0.50-in.-thick steel casing was applied to the concentration data during the analysis process. Although this correction factor does not match actual field conditions, it is the closest to the field conditions. Use of this casing correction factor will cause radionuclide concentrations to be undercalculated.

Log Plot Notes:

Separate log plots show the man-made and the naturally occurring radionuclides. The natural radionuclides can be used for lithology interpretations. The headings of the plots identify the specific gamma rays used to calculate the apparent concentrations. Uncertainty bars on the plots show the statistical uncertainties for the measurements as 95-percent confidence intervals. Open circles on the plots give the MDL. The MDL of a radionuclide represents the lowest concentration at which positive identification of a gamma-ray peak is statistically defensible.

A combination plot includes the man-made and natural radionuclides, the total gamma derived from the spectral data, and the Tank Farms gross gamma log. The gross gamma plot displays the latest available digital data. No attempt has been made to adjust the depths of the gross gamma logs to coincide with the SGLS data.



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A time-sequence plot of the historical gross gamma log data from 1980 to 1988 is presented with the SGLS log plots.

In addition, a rerun log showing the apparent concentrations of man-made and naturally occurring radionuclides from two separate log runs is included. The rerun log covers the depth interval from 50 to 65 ft.

Results/Interpretations:

The man-made radionuclides Cs-137, Co-60, Eu-154, and Eu-152 were detected by the SGLS. The Cs-137 contamination was detected in the upper 20 ft of the borehole with detections continuously from the ground surface to a depth of 8.5 ft. The maximum Cs-137 concentration was 223.3 pCi/g at 2.5 ft. Cs-137 contamination was also detected continuously from 10 to 13 ft and almost continuously from 16.5 to 19.5 ft.

Co-60 contamination was detected continuously from 49.5 ft to the bottom of the logged interval (86 ft). The maximum apparent Co-60 concentration of 377.1 pCi/g was recorded at 78 ft.

Eu-154 was detected continuously from 2 to 3.5 ft at apparent concentrations of about 0.7 to 2.5 pCi/g and almost continuously from 48.5 ft to the bottom of the logged interval. The maximum apparent Eu-154 concentration of 233.17 pCi/g was measured at 64.5 ft.

Eu-152 contamination was detected continuously from 50 to 51 ft and almost continuously from 63.5 to 70 ft. The maximum apparent Eu-152 concentration of 6.2 pCi/g occurred at 64.5 ft.

KUT concentrations were low throughout much of the borehole, as a result of the triple and double casing present in the borehole. Apparent K-40 concentrations were very low (4 to 5 pCi/g) from the ground surface to about 40 ft. Apparent K-40 concentrations increase slightly to about 6 pCi/g below 40 ft and increase sharply below 68.5 ft. K-40 and Th-232 concentrations decrease below 85 ft.